

CLAIMS

What is claimed is:

1 1. A downhole injection valve assembly for controlling the downhole insertion
2 of chemical into a well through capillary tubing, said downhole injection valve assembly
3 comprising:

4 an elongated tubular housing including an inlet end and an outlet end;

5 said elongated tubular housing including means for attachment to the capillary
6 tubing at said inlet end;

7 a first adjustable mechanically biased check valve positioned within said
8 elongated tubular housing at said inlet end, the amount of bias on said first adjustable
9 mechanically biased check valve being determined by the characteristics of said well, the
10 chemical being inserted into the well, and the characteristics of the system for causing the
11 chemical to flow through the capillary tubing;

12 a second mechanically biased check valve positioned within said elongated
13 tubular housing at said outlet end to prevent the entry of gas, fluids or solids from said well
14 bore into the interior portion of said elongated tubular housing.

1 2. The down hole injection valve assembly as defined in Claim 1 wherein said
2 characteristics of said well include the depth of the well, and the flowing bottom-hole
3 pressure at the bottom of the well.

1 3. The downhole injection valve assembly as defined in Claim 1 wherein the
2 characteristics of the system for causing the chemical to flow through the capillary tubing
3 includes at least the chemical pump pressure, the size of the capillary tubing, and the length
4 of the capillary tubing.

1 4. The downhole injection valve assembly as defined in Claim 1 wherein
2 mechanical bias on said first check valve is provided by a coil spring.

1 5. The downhole injection valve assembly as defined in Claim 1 wherein
2 mechanical bias on said second check valve is provided by a coil spring.

1 6. The downhole injection valve assembly as defined in Claim 1 wherein said
2 first check valve is a ball and seat valve.

1 7. The downhole injection valve assembly as defined in Claim 6 wherein said
2 seat is formed from a hardened material.

1 8. The downhole injection valve assembly as defined in Claim 4 wherein said
2 bias on said first check valve is determined by the amount of compression of said coil spring.

1 9. The downhole injection valve assembly as defined in Claim 8 wherein the
2 amount of compression on said coiled spring is determined by the position of a spring carrier
3 within said elongated tubular housing.

1 10. A system for the control of a condition at the downhole portion of a well, said
2 system comprising:

3 a chemical selected for its ability to control the condition at the downhole
4 portion of a well;

5 a capillary tube for conducting said chemical from the surface to the downhole
6 portion of the well;

7 a chemical pump for causing said chemical to flow through said capillary
8 tube;

9 an injection valve assembly including:

10 an elongated tubular housing including an inlet end and an outlet end;

11 said elongated tubular housing including means for attachment to the
12 capillary tubing at said inlet end;

13 a first adjustable mechanically biased check valve positioned within
14 said elongated tubular housing at said inlet end, the amount of bias on said first adjustable
15 mechanically biased check valve being determined by the characteristics of said well, the
16 chemical being inserted into the well, and the characteristics of the system for causing the
17 chemical to flow through the capillary tubing;

18 a second mechanically biased check valve positioned within said
19 elongated tubular housing at said outlet end to prevent the entry of gas, fluids or solids from
20 said well bore into the interior position of said elongated tubular housing.

1 11. The system as defined in Claim 1 wherein said characteristics of said well
2 include the depth of the well, and the flowing hole pressure at the bottom of the well.

1 12. The system as defined in Claim 1 wherein the characteristics of the system for
2 causing the chemical to flow through the capillary tubing includes chemical pump pressure.

1 13. The system as defined in Claim 1 wherein mechanical bias on said first check
2 valve is provided by a coil spring.

1 14. The system as defined in Claim 1 wherein mechanical bias on said second
2 check valve is provided by a coil spring.

1 15. The system as defined in Claim 1 wherein said first check valve is a ball and
2 seat valve.

1 16. The system as defined in Claim 15 wherein said seat is formed from a
2 hardened material.

1 17. The system as defined in Claim 4 wherein said bias on said first check valve is
2 determined by the amount of compression of said coil spring.

1 18. The system as defined in Claim 8 wherein the amount of compression on said
2 coiled spring is determined by the position of a spring carrier within said elongated tubular
3 housing.

1 19. A method for controlling the amount of a chemical inserted downhole into a
2 well through capillary tubing, said method comprising the steps of:
3 placing a first adjustable mechanically biased check well at the end of the
4 capillary tubing within the well wherein said mechanical bias is determined by the condition
5 of the well, the chemical to be inserted into the well, and the system for causing the chemical
6 to flow through the capillary tubing;
7 placing a second mechanically biased check valve in series with said first
8 check valve;